

REFERENCE SLIP

5-18-74

TO

Mr. E. A. Taylor

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REMARKS

Ed -

Sorry I didn't have a chance to have this typed, will do so next week. This is complete except for a discussion of Delnav and Co-Ral, the two mostly widely used OP sprays & dips. When Food & Drug forced DuPont to withdraw Dip 30 from the market Delnav came on strong and has been widely & successfully used. CO-Ral is equally effective but has been less extensively used because of its cost.

Hugh

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FROM

MAY 21 1974

AREA OFFICE
WESLACO, TEXAS

5-2-34

Mr. E. A. Taylor

RECEIVED

MAY 21 1934

AREA OFFICE
WESTLACO, TEXAS

The Gulf Coast tick, Amblyomma maculatum, is widely distributed in the new world, but is most abundant in coastal regions of high humidity. In the United States it is found along the entire coast of the Gulf of Mexico but does not usually extend inland more than 100-150 miles. ~~However~~, during wet climatic cycles the tick survives and reproduces farther inland but disappears from those areas during periods of average or less than average rainfall.

Each stage of development seeks a different host. The larvae and nymphs parasitize a large variety of birds and small animals while the adults prefer larger animals such as deer, coyotes, dogs and all kinds of livestock. The adults are serious enemies of ~~domestic~~ cattle and other domestic animals because of their injuries to the ear and the frequency with which they predispose screwworm attacks. The ticks attach to the ear, especially to the inner surface of the outer ear but also to the outer surface of ~~the ear~~ and base of the ear, base of the horns and in skin folds such as around the hump of Brahma cattle. The ticks cause the ear to swell and cracks and serum oozes from the lesions. These sites are highly attractive to ovipositing screwworm flies and during the height of the tick season more than ~~80%~~ 85% of the screwworm infestations are predisposed

by Gulf Coast ticks injury

There appears to be only one generation of the ticks per year. When the engorged female ticks drop from the host she seeks cover and concealment on the surface of the soil. The eggs are deposited at these sites, an average of over 8000 per female and as many as 18,000 have been reported. During the late fall summer and early fall the eggs hatch in 19 to 60 days depending on temperature but eggs deposited in the late fall may not hatch until the following spring.

The larvae may overwinter in pastures in ~~at~~ either the fed or unfed condition. Scientific studies have shown most of the larvae feed on a bird or small rodent during the period August to November. Molting takes place on the ground within 9 to 12 days if the temperatures are above 70°F . Feeding nymphs are found on the kinds of hosts at almost anytime of the year but typically are most abundant in the late fall and early spring. Longevity of the nymph may vary from 2 to 6 months depending on weather conditions and the availability of hosts. After engorging, the nymphs search for a protected resting place, often in the crowns of bunch grass. At $70 - 80^{\circ}\text{F}$ the nymphs molt in about 20 days but nymphs that engorge in the fall may not molt until the following spring.

The adults may be found on their hosts at any time from April until October but are most abundant from July until September. A number of records indicate that peak abundance is most likely to occur about the middle of July. Males ordinarily attach before females and ~~most~~ early reports of Gulf Coast ticks on cattle are usually based on ~~the~~ finding a few males. Gladney (1971) has shown that ~~males~~ unfed females search for males that are already attached. Males apparently ~~remain~~ (on the same host) ~~and may~~ survive for several months [↑] and are capable of inseminating numerous females.

The unfed female moves about on the body of the host and appears to have a strong inclination to attach (1) near an attached male (2) near aggregations of attached ticks (3) on or near the ears of the host animal.

Males attach and feed for 6-7 days before they are ready to copulate. Females will feed but will not engorge until they have mated so the time that females remain on a host is usually dependent on the time of mating. If several sexually mature males are already present when the female attaches she will usually, feed, mate, engorge and detach within 6-8 days after she attached to the host (Hixson 1940)

CONTROL

It has been reported by ranchers that both pasture burning and mowing helps to reduce the numbers of Gulf Coast ticks found in a particular locality. Since the ~~non-feeding~~ ^{unfed} forms of the ticks are highly susceptible to desiccation it is reasonable to presume that many are killed by any practice that reduces the soil and air humidity at ground level. Such ~~pr~~ cultural practices cannot be expected to keep pastures tick free however because of the movement of tick-infested birds, rodents and other wild animals from one pasture to another.

For many years livestock owners used a large variety of home remedies to treat the ears of their domestic animals. These remedies included such materials as axle grease, turpentine, kerosene and many others. After screwworms moved from Texas to the southeastern United States in 1933 concerted efforts were made to control Gulf Coast ticks as a means of alleviating the screwworm problem. Spick and Dove (1938) recommended swabbing the ears of a cattle with a mixture of 3 ^{quarts} ~~pints~~ of pine tar oil, 1 quart of cottonseed or linseed oil and 1 pint of benzol. This mixture killed the ticks in the ears at time of application and also was claimed to repel attaching adults for as long as 17 days.

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at this same time many southern ranchers were still combatting the fever ticks and ~~dipping~~ vats charged with arsenic dip were readily available - Undoubtedly many Gulf Coast ticks were killed by dipping cattle in arsenical solutions but these treatments had two deficiencies: (1) it was very difficult to wet the inside surface of the ear and (2) ~~arsenic~~ no ^{significant} residue of arsenic was deposited on the hair to continue to kill unfed adults that were moving over the ~~body~~ cattle in search of a site of attachment -

~~With~~ When DDT became available to researchers in 1944 Rude and Smith (1944) and Rude (1946) developed a formulation of the insecticide in a non-drying adhesive that gave excellent tick control. Their Stock 1037, developed at the Menard, Texas laboratory, consisted of 5% DDT, 47% rosin, 33% Hercolyn (hydrogenated methyl abietate) and 15% dibutyl phthalate. The mixture killed all of the ticks in the ears and prevented reinfestation for 3-6 weeks; in other words, ~~two~~ ^{two} treatments per season was all that was required in many localities. One gallon of the material was adequate to treat 125-150 head of cattle. Rude recommended application to the ears of cattle and sheep as soon as the ticks ^{were} ~~are~~ numerous. The sticky preparation was smeared on the inside and outside of the ears and around the base of the horns with the bare hands. The obvious disadvantage of this treatment

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and probably the principal reason that it never became highly popular, was the large ~~necessity to~~ amount of time required to run the cattle through a squeeze chute and hand treat each ear -

It was also shown that DDT could also be applied as a spray using about $1\frac{1}{2}$ to 2 pints of 2.3% DDT per animal to wet all parts of the body. In tests conducted in Florida the sprays were equal to 2 ear smears, Stock 1037 and a cold cream base smear (Savannah No 5, with 7.5% DDT), in both initial kill and protection against reinfestation. The tests showed that all formulations gave ~~about one month's~~ satisfactory control for about one month. It was concluded that in the Southeast two applications of the spray, one in late July or early August and another ~~in~~ one month later, would ~~give~~ provide a full season's tick control.

In a report of the same work in the Journal of Economic Entomology, it appeared that the tests were started late in the season when populations were declining as the number of ticks on untreated animals had greatly decreased 2-4 weeks after the cattle were treated. In their conclusions, the authors say that the number of applications required and the minimum effective dose were not determined.

(7)
Work by USDA researchers in Texas and Florida showed that the concentration of DDT in sprays and dips could be reduced if gamma-BHC was added to make a combination spray or dip. Work with several species of ticks demonstrated the value of sprays that contained 0.25% technical benzene hexachloride (mixed isomers, usually 12% gamma-BHC) and 0.5 to 0.75% DDT. The very effective and popular Dux Pont Dip 30 was extensively used in Florida and other southeastern states at a concentration of 0.5% DDT plus 0.03% gamma-BHC (from mixed isomers). Kripling (1952) said that sprays containing 0.5% toxaphene or benzene hexachloride (0.025% gamma isomer) and 0.5% DDT had been successfully used against Amblyomma maculatum and several other species of livestock ticks.

Early experiments conducted in Bee County, Texas by workers at the Kerrville laboratory (Clark and Deer) indicated that toxaphene wettable powder was completely effective in destroying all ticks on cattle at time of spraying or dipping and gave 2-3 weeks protection against any damaging reinfestation (unpublished, Kerrville ~~TX~~, 4th QR 1948). Smears containing 2% gamma-BHC plus 10% toxaphene, chlordane or DDT were also tested. The smears containing toxaphene and chlordane were more effective in protecting against reinfestation than the one with DDT.

Special formulations of toxaphene for use in vats were developed in 1948

and 1949 and Tests by Clark & Vallier (unpublished) indicated that 2 weeks' effective protection was provided by dipping cattle in the Coopertox formulation prepared to provide 0.5% toxaphene. The number of screwworm cases predisposed by ticks injury was reduced from 40 to none in a herd dipped in Coopertox and from 27 to 1 in another herd dipped twice at biweekly intervals in another formulation of toxaphene.

Knimpling (1951) in a compilation of results ~~observed~~ obtained by several workers said that 0.025% gamma-BHC plus 0.5% DDT would give good control of Gulf Coast ticks for 2 to 3 weeks. Chlordane was about equally effective against lone star and Gulf Coast ticks, that is a concentration of 0.5% gave nearly complete kill of all stages and was about equal to DDT for protection against reinfestation. Good control of all stages resulted when cattle were dipped or sprayed with 0.5% Toxaphene. Also, good protection against reinfestation was provided for 2 to 3 weeks, depending on the abundance of ticks. It was concluded that 0.5% toxaphene and a combination 0.025% lindane - 0.5% DDT sprays were comparable in effectiveness for control of this tick.



SCREWWORM

&

GULF COAST TICK
SYMPOSIUM



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The Gulf Coast tick, Amblyomma maculatum is widely distributed in the New World, but is most abundant in coastal regions of high humidity. In the United States it is found along the entire coast of the Gulf of Mexico but does not usually extend inland more than 100-150 miles. During wet climatic cycles the tick survives and reproduces farther inland but disappears from those areas during periods of average or less than average rainfall.

Each stage of development seeks a different host. The larvae and nymphs parasitize a large variety of birds and small animals while the adults prefer larger animals such as deer, coyotes, dogs and all kinds of livestock. The adults are serious enemies of cattle and other domestic animals because of their injuries to the ear and the frequency with which they predispose screwworm attacks. The ticks attach to the ear, especially to the inner surface of the outer ear but also to the outer surface and base of the ear, base of the horns and in skin folds such as around the hump of Brahma cattle. The ticks cause the ear to swell and crack and serum oozes from the lesions. These sites are highly attractive to ovipositing screwworm flies and during the height of the tick season more than 85% of the screwworm infestations are predisposed by Gulf Coast tick injury.

There appears to be only one generation of the tick per year. When the engorged female tick drops from the host she seeks cover and concealment on the surface of the soil. The eggs are deposited at these sites, an average of over 8,000 per female and as many as 18,000 have been reported. During the late summer and early fall the eggs hatch in 19 to 60 days depending on temperature but eggs deposited in the late fall may not hatch until the following spring.

The larvae may overwinter in pastures in either the fed or unfed condition. Scientific studies have shown most of the larvae feed on a bird or small rodent during the period August to November. Molting takes place on the ground within 9 to 12 days if temperatures are above 70°F. Feeding nymphs are found on the kinds of hosts at almost anytime of the year but typically are most abundant in the late fall and early spring. Longevity of the nymph may vary from 2 to 6 months depending on weather conditions and the availability of hosts. After engorging, the nymphs search for a protected resting place, often in the crowns of bunch grass. At 70-80°F the nymphs molt in about 20 days but nymphs that engorge in the fall may not molt until the following spring.

The adults may be found on their hosts at any time from April until October but are most abundant from July until September. A number of records indicate that peak abundance is most likely to occur about the middle of July. Males ordinarily attach before females and early reports of Gulf Coast ticks on cattle are usually based on finding a few males.

The following table shows the results of the analysis of the material collected from the various localities. The material was analyzed for the presence of the various elements and the results are given in the following table.

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Gladney (1971) has shown that unfed females search for males that are already attached. Males apparently survive for several months (on the same host) and are capable of inseminating numerous females.

The unfed female moves about on the body of the host and appears to have a strong inclination to attach (1) near an attached male, (2) near aggregations of attached ticks, (3) on or near the ears of the host animal.

Males attach and feed for 6-7 days before they are ready to copulate. Females will feed but will not engorge until they have mated so the time that females remain on a host is usually dependent on the time of mating. If several sexually mature males are already present when the female attaches she will usually feed, mate, engorge and detach within 6-8 days after she attached to the host (Hixson 1940).

CONTROL

It has been reported by ranchers that both pasture burning and mowing help to reduce the numbers of Gulf Coast ticks found in a particular locality. Since the unfed forms of the ticks are highly susceptible to desiccation it is reasonable to presume that many are killed by any practice that reduces the soil and air humidity at ground level. Such cultural practices cannot be expected to keep pastures tick free however because of the movement of tick-infested birds, rodents and other wild animals from one pasture to another.

For many years livestock owners used a large variety of home remedies to treat the ears of their domestic animals. These remedies included such materials as axle grease, turpentine, kerosene and many others. After screwworms moved from Texas to the southeastern United States in 1933 concerted efforts were made to control Gulf Coast ticks as a means of alleviating the screwworm problem. Spicer and Dove (1938) recommended swabbing the ears of cattle with a mixture of 3 quarts of pine tar oil, 1 quart of cottonseed or linseed oil and 1 pint of benzol. This mixture killed the ticks in the ears at time of application and also was claimed to repel attaching adults for as long as 17 days.

At this same time many southern ranchers were still combatting a fever tick and vats charged with arsenic dip were readily available. Undoubtedly many Gulf Coast ticks were killed by dipping cattle in arsenical solutions but these treatments had two deficiencies: (1) it was very difficult to wet the inside surface of the ear and (2) no significant residue of arsenic was deposited on the hair to continue to kill unfed adults that were moving over the cattle in search of a site of attachment.

Olshansky (1971) has shown that unfed female ticks search for hosts that are already attached. Males apparently survive for several months (or the same host) and are capable of transmitting numerous females.

The unfed female moves about on the body of the host and appears to have a strong inclination to attach (1) near an attached male, (2) near aggregations of attached ticks, (3) on or near the ears of the host animal.

Males attach and feed for 4-7 days before they are ready to copulate. Females will feed but will not copulate until they have mated at the time that females remain on a host is usually dependent on the time of mating. It is generally assumed that males are already present when the female attaches and will usually feed, mate, engorge and detach within 6-8 days after she attached to the host (Hixson 1969).

CONTROL

It has been reported by ranchers that both pasture burning and mowing help to reduce the numbers of Gulf Coast ticks found in a particular locality. Since the unfed forms of the ticks are highly susceptible to desiccation it is reasonable to presume that many are killed by dry pastures that reduce the soil and air humidity at ground level. Such cultural practices cannot be expected to keep pastures tick free however because of the movement of tick-infested birds, rodents and other wild animals from one pasture to another.

For many years livestock owners used a large variety of home remedies to treat the ears of their domestic animals. These remedies included such materials as axle grease, turpentine, kerosene and many others. After numerous moves from Texas to the southeastern United States in 1933 concerned efforts were made to control Gulf Coast ticks as a means of alleviating the serious problem. Baker and Dove (1938) recommended washing the ears of cattle with a mixture of 3 parts of pine tar oil, 1 part of cottonseed or linseed oil and 1 pint of benzol. This mixture killed the ticks in the ears at time of application and also was claimed to repel attaching adults for as long as 14 days.

At this same time many southern ranchers were still combating a fever tick and were charged with arsenic dip were readily available. Undoubtedly many Gulf Coast ticks were killed by dipping cattle in arsenical solutions but these treatments had two disadvantages: (1) it was very difficult to wash the inside surfaces of the ear and (2) no significant residues of arsenic was deposited on the hair so continued to kill unfed adults that were moving over the cattle in search of a site of attachment.

When DDT became available to researchers in 1944 Rude and Smith (1944) and Rude (1946) developed a formulation of the insecticide in a non-drying adhesive that gave excellent tick control. Their Stock 1037, developed at the Menard, Texas laboratory, consisted of 5% DDT, 47% rosin, 33% Herculyn (hydrogenated methyl abietate) and 15% dibutyl phthalate. The mixture killed all of the ticks in the ears and prevented reinfestation for 3-6 weeks; in other words, two treatments per season was all that was required in many localities. One gallon of the material was adequate to treat 125-150 head of cattle. Rude recommended application to the ears of cattle and sheep as soon as the ticks were numerous. The sticky preparation was smeared on the inside and outside of the ears and around the base of the horns with the bare hands. The obvious disadvantage of this treatment, and probably the principal reason that it never became highly popular, was the large amount of time required to run the cattle through a squeeze chute and hand treat each ear.

It was also shown that DDT could also be applied as a spray using about 1 1/2 to 2 pints of 2.3% DDT per animal to wet all parts of the body. In tests conducted in Florida the sprays were equal to 2 ear smears, Stock 1037 and a cold cream base smear (Savannah No. 5, with 7.5% DDT), in both initial kill and protection against reinfestation. The tests showed that all formulations gave satisfactory control for about one month. It was concluded that in the Southeast two applications of the spray, one in late July or early August and another one month later, would provide a full season's tick control.

In a report of the same work in the Journal of Economic Entomology, it appeared that the tests were started late in the season when populations were declining as the number of ticks on untreated animals had greatly decreased 2-4 weeks after the cattle were treated. In their conclusions, the authors say that the number of applications required and the minimum effective dose were not determined.

Work by USDA researchers in Texas and Florida showed that the concentration of DDT in sprays and dips could be reduced if gamma - BHC was added to make a combination spray or dip. Work with several species of ticks demonstrated the value of sprays that contained 0.25% technical benzene hexachloride (mixed isomers, usually 12% gamma - BHC) and 0.5 to 0.75% DDT. The very effective and popular Du Pont Dip 30 was extensively used in Florida and other southeastern states at a concentration of 0.5% DDT plus 0.03% gamma - BHC (from mixed isomers). Knipling (1952) said that sprays containing 0.5% toxaphene or benzene hexachloride (0.025% gamma isomer) and 0.5% DDT had been successfully used against Amblyomma maculatum and several other species of livestock ticks.

When DDT became available to researchers in 1944 Hadd and Smith (1944) and Rude (1945) developed a formulation of the insecticide in a non-sticky adhesive that gave excellent tick control. Their Stock 1037, developed at the Menard, Texas Laboratory, consisted of 5% DDT, 47% rosin, 33% hexcellyn (hydrogenated methyl stearate) and 1% dibutyl phthalate. The mixture killed all of the ticks in the ears and prevented reinfestation for 3-6 weeks; in other words, two treatments per season was all that was required in many localities. One gallon of the material was adequate to treat 125-150 head of cattle. Hadd recommended application to the ears of cattle and sheep as soon as the ticks were numerous. The sticky preparation was smeared on the inside and outside of the ears and around the base of the horns with the bare hands. The obvious disadvantage of this treatment, and probably the principal reason that it never became highly popular, was the large amount of time required to run the cattle through a squeeze chute and hand treat each ear.

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Special formulations of toxaphene for use in vats were developed in 1948 and 1949 and tests by Clark & Vallier (Unpublished) indicated that 2 weeks effective protection was provided by dipping cattle in the Coopertox formulation prepared to provide 0.5% toxaphene. The number of screwworm cases predisposed by tick injury was reduced from 40 to none in a herd dipped in Coopertox and from 27 to 1 in another herd dipped twice at biweekly intervals in another formulation of toxaphene.

Knipling (1951) in a compilation of results obtained by several workers said that 0.025% gamma - BHC plus 0.5% DDT would give good control of Gulf Coast ticks for 2 to 3 weeks. Chlordane was about equally effective against lone star and Gulf Coast ticks, that is a concentration of 0.5% gave nearly complete kill of all stages and was about equal to DDT for protection against reinfestation. Good control of all stages resulted when cattle were dipped or sprayed with 0.5% toxaphene. Also, good protection against reinfestation was provided for 2 to 3 weeks, depending on the abundance of ticks. It was concluded that 0.5% toxaphene and a combination 0.025% lindane - 0.5% DDT sprays were comparable in effectiveness for control of this tick.

Justification for allotment of contingency funds for research on control of Gulf Coast tick. - 1974 summer field tests.

The Gulf Coast tick, Amblyomma maculatum, is a highly important enemy of cattle and other classes of livestock each summer in a region about 100 to 150 miles wide around the entire Gulf Coast of the United States and along the Atlantic Seaboard as far north as South Carolina. The adult ticks attach to the inner and outer surfaces of the ears of cattle in large numbers and cause extensive swelling of the ear, cracking of the skin and the ear becomes covered with a wet, sticky coating of serum, with some blood and tick feces. The ticks are very irritating to the host and cattle often further injure the ears and head by rubbing against trees, posts and other objects. If cattle, especially young animals, become heavily infested with ticks the ears become deformed and typically present a condition known as "gotch ear." Cattle buyers discriminate against gotch-eared calves and either refuse to buy them or dock them as much as \$4.00 per hundred weight.

In addition, cattle that are heavily infested with ticks do not feed normally and the ticks interfere with weight gains or even cause cattle to lose weight and condition.

Historically, the most serious losses caused by the Gulf Coast tick are those that result when screwworm infest the ears. The lesions caused by the ticks and accompanying suppuration are highly attractive to ovipositing screwworm flies and over 85% of the screwworm cases in the Gulf Coast tick area in July, August and September are predisposed by tick injury. This was true when the problem was studied in the 1930's and it was again

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true in Subtropical Texas in 1973. In fact, the problem was in many ways even more acute in 1973 than it was before 1962 when the Southwestern Screwworm Eradication Program was launched because in the 11 year interval ranchers had relaxed their vigilance and dropped many of their tick control measures. In the years that they did not have to contend with screwworms many ranchers ignored the Gulf Coast tick, partly because of the cost of insecticides, but mostly because of the labor shortage and the near impossibility of gathering cattle for spraying or dipping on schedule.

No monetary figures are available, but Subtropical Texas cattle raisers suffered an enormous loss from the combined effects of tick and screwworm injury in 1972 and 1973. These losses resulted from the death of livestock, from depreciation in the value of animals that survived and from the cost of supplies and labor for tick and screwworm control. Many ranchers felt compelled to cut the ears off of their cows and on some of the larger ranches hundreds of cattle lost their ears due to this parasite and/or screwworm infestation.

The tick-screwworm infestation was very expensive to APHIS and the Texas Animal Health Commission. Most of the screwworm cases in Texas in 1973 were predisposed by Gulf Coast tick injury and very heavy drops of sterile flies were made in the infested region for a period of about 5 months. Other large amounts of money were spent for insecticide and livestock inspectors to help combat the two pests.

An apparently aberrant population of Gulf Coast has become established in northeastern Oklahoma and southeastern Kansas and has built up to the extent that it causes important economic losses. The ability of the tick

true in subtropical Texas in 1973. In fact, the problem was in many ways even more acute in 1973 than it was before 1963 when the Southwestern Serengeti Irradiation Program was launched because in the 11 year interval ranchers had relaxed their vigilance and dropped many of their tick control measures. In the years that they did not have to contend with serengeti many ranchers ignored the Gulf Coast tick, partly because of the cost of insecticides, but mostly because of the labor shortage and the impossibility of gathering cattle for spraying or dipping on schedule. No monetary figures are available, but subtropical Texas cattle raisers suffered an enormous loss from the combined effects of tick and serengeti injury in 1973 and 1975. These losses resulted from the death of livestock, from depredation in the value of animals that survived and from the cost of supplies and labor for tick and serengeti control. Many ranchers felt compelled to cut the ears off of their cows and on some of the larger ranches hundreds of cattle lost their ears due to this parasite and/or serengeti infestation. The tick-serengeti infestation was very expensive to APHIS and the Texas Animal Health Commission. Most of the serengeti cases in Texas in 1973 were predisposed by Gulf Coast tick injury and very heavy drops of sterile flies were made in the infested region for a period of about 5 months. Other large amounts of money were spent for insecticides and livestock inspectors to help combat the two pests. An apparently abundant population of Gulf Coast has become established in northeastern Oklahoma and southeastern Kansas and has built up to the extent that it causes important economic losses. The ability of the tick

to survive in an area that was once outside of its normal range is quite disturbing as it suggests a genetic adaptability that could cause what has been considered a regional problem to become a national problem. The possibility of eliminating or modifying this population of the species before it becomes more widespread should be studied.

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One possible method of controlling the population of the species is
 the use of chemical repellents. The use of chemical repellents has been
 successful in controlling the population of the species in some areas.
 The use of chemical repellents is a method of controlling the population
 of the species that is not harmful to the environment. The use of
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Gulf Coast Ticks

1974 Field Tests

1. Insecticidal control

A. Ear smears - (In cooperation with J. Deer)

Stock 1037 or similar base plus various registered insecticides. Determine initial kill and period of protection against reinfestation.

(Perhaps include 5% coumaphos dust as used for spinose ear tick control).

B. Dust bags

Test commercially available bags by keeping them in tick infested pastures and making weekly, if possible, or bi-weekly counts of adult ticks in ears of cattle.

C. Conventional sprays & dips

Tick infestations and screwworm infestations in herds sprayed or dipped with coumaphos, toxaphene, dioxathion, Rabon, Supona and other insecticides.

D. Use of ear tags, halters and other devices impregnated with dichlorvas and other volatile insecticides. Determine effectiveness of such devices and duration of effectiveness.

I. Insecticidal control

A. Bar screens - (In cooperation with J. Bear)

Stock 1037 or similar base plus various registered insecticides.

Determine initial kill and period of protection against

reinfestation.

(Perhaps include 5% coumaphos dust as used for equine ear

tick control).

B. Dust bags

Test commercially available bags by keeping them in tick infested

pastures and making weekly, if possible, or bi-weekly counts of

adult ticks in ears of cattle.

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or dipped with coumaphos, toxaphene, diazinon, malathion, DDT, etc.

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D. Use of ear tags, halters and other devices impregnated with

dichlorvos and other volatile insecticides. Determine effective-

ness of such devices and duration of effectiveness.

Manpower and Equipment Needs

Gulf Coast Tick Field Tests

- I. 4-6 new men (temporary - Graduate students)
- II. 2 vehicles (pick-ups or panel wagons)
- III. 1 new power sprayer
- IV. Chemicals
 - (1) 300 ft. 3/4" Vapona impregnated PVC resin strips.
300 ft. 3/4" Vapona + Prolate (Imidan) strips.
300 ft. 3/4" Vapona + Ralion strips.
 - (2) Dust Bags
 - a. 1% Co-Ral (20 bags)
 - b. 3% Co-Ral " "
 - c. 3% Cisdrin " "
 - d. 3% Rabon " "
 - e. Homemade 5% toxaphene dust bags?
 - (3) Spray-on materials
 - a. 10 gal. 61% E.C. Toxaphene (for 0.5% finished spray)
 - b. 10 gal. Rabon E.C. concentrate
 - c. 10 gal. Co-Ral E.C. concentrate
 - d. 10 gal. Delnav E.C. concentrate (0.15% finished spray)
 - (4) Smears

Manpower and Equipment Needs Gulf Coast Fish Wild Tass

I. 4-6 new men (temporary - Graduate students)

II. 2 vehicles (pick-ups or panel wagons)

III. 1 new power sprayer

IV. Chemicals

(1) 300 lb. 3/4" Vapors impregnated PVC resin strips.

300 lb. 3/4" Vapors + Prolate (Imidan) strips.

300 lb. 3/4" Vapors + Ralston strips.

(2) Dust bags

a. 12 Co-Ral (30 bags)

b. 32 Co-Ral "

c. 32 Cladria "

d. 32 Rabon "

e. Homemade 32 toxaphene dust bags

(3) Spray-on materials

a. 10 gal. 612 E.C. Toxaphene (for 0.5% finished spray)

b. 10 gal. Rabon E.C. concentrate

c. 10 gal. Co-Ral E.C. concentrate

d. 10 gal. Dalmay E.C. concentrate (0.12% finished spray)

(4) Shirts

The Gulf Coast tick, Amblyomma maculatum is widely distributed in the New World, but is most abundant in coastal regions of high humidity. In the United States it is found along the entire coast of the Gulf of Mexico but does not usually extend inland more than 100-150 miles. During wet climatic cycles the tick survives and reproduces farther inland but disappears from those areas during periods of average or less than average rainfall.

Each stage of development seeks a different host. The larvae and nymphs parasitize a large variety of birds and small animals while the adults prefer larger animals such as deer, coyotes, dogs and all kinds of livestock. The adults are serious enemies of cattle and other domestic animals because of their injuries to the ear and the frequency with which they predispose screwworm attacks. The ticks attach to the ear, especially to the inner surface of the outer ear but also to the outer surface and base of the ear, base of the horns and in skin folds such as around the hump of Brahma cattle. The ticks cause the ear to swell and crack and serum oozes from the lesions. These sites are highly attractive to ovipositing screwworm flies and during the height of the tick season more than 85% of the screwworm infestations are predisposed by Gulf Coast tick injury.

There appears to be only one generation of the tick per year. When the engorged female tick drops from the host she seeks cover and concealment on the surface of the soil. The eggs are deposited at these sites, an average of over 8,000 per female and as many as 18,000 have been reported. During the late summer and early fall the eggs hatch in 19 to 60 days depending on temperature but eggs deposited in the late fall may not hatch until the following spring.

The larvae may overwinter in pastures in either the fed or unfed condition. Scientific studies have shown most of the larvae feed on a bird or small rodent during the period August to November. Molting takes place on the ground within 9 to 12 days if temperatures are above 70°F. Feeding nymphs are found on the kinds of hosts at almost anytime of the year but typically are most abundant in the late fall and early spring. Longevity of the nymph may vary from 2 to 6 months depending on weather conditions and the availability of hosts. After engorging, the nymphs search for a protected resting place, often in the crowns of bunch grass. At 70-80°F the nymphs molt in about 20 days but nymphs that engorge in the fall may not molt until the following spring.

The adults may be found on their hosts at any time from April until October but are most abundant from July until September. A number of records indicate that peak abundance is most likely to occur about the middle of July. Males ordinarily attach before females and early reports of Gulf Coast ticks on cattle are usually based on finding a few males.

The Gulf Coast tick, *Amblyomma maculatum*, is widely distributed in the New World, but is most abundant in coastal regions of high humidity. In the United States it is found along the entire coast of the Gulf of Mexico but does not usually extend inland more than 100-150 miles. During wet climatic cycles the tick survives and reproduces farther inland but disappears from those areas during periods of average or less than average rainfall.

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Gladney (1971) has shown that unfed females search for males that are already attached. Males apparently survive for several months (on the same host) and are capable of inseminating numerous females.

The unfed female moves about on the body of the host and appears to have a strong inclination to attach (1) near an attached male, (2) near aggregations of attached ticks, (3) on or near the ears of the host animal.

Males attach and feed for 6-7 days before they are ready to copulate. Females will feed but will not engorge until they have mated so the time that females remain on a host is usually dependent on the time of mating. If several sexually mature males are already present when the female attaches she will usually feed, mate, engorge and detach within 6-8 days after she attached to the host (Hixson 1940).

CONTROL

It has been reported by ranchers that both pasture burning and mowing help to reduce the numbers of Gulf Coast ticks found in a particular locality. Since the unfed forms of the ticks are highly susceptible to desiccation it is reasonable to presume that many are killed by any practice that reduces the soil and air humidity at ground level. Such cultural practices cannot be expected to keep pastures tick free however because of the movement of tick-infested birds, rodents and other wild animals from one pasture to another.

For many years livestock owners used a large variety of home remedies to treat the ears of their domestic animals. These remedies included such materials as axle grease, turpentine, kerosene and many others. After screwworms moved from Texas to the southeastern United States in 1933 concerted efforts were made to control Gulf Coast ticks as a means of alleviating the screwworm problem. Spicer and Dove (1938) recommended swabbing the ears of cattle with a mixture of 3 quarts of pine tar oil, 1 quart of cottonseed or linseed oil and 1 pint of benzol. This mixture killed the ticks in the ears at time of application and also was claimed to repel attaching adults for as long as 17 days.

At this same time many southern ranchers were still combatting a fever tick and vats charged with arsenic dip were readily available. Undoubtedly many Gulf Coast ticks were killed by dipping cattle in arsenical solutions but these treatments had two deficiencies: (1) it was very difficult to wet the inside surface of the ear and (2) no significant residue of arsenic was deposited on the hair to continue to kill unfed adults that were moving over the cattle in search of a site of attachment.

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When DDT became available to researchers in 1944 Rude and Smith (1944) and Rude (1946) developed a formulation of the insecticide in a non-drying adhesive that gave excellent tick control. Their Stock 1037, developed at the Menard, Texas laboratory, consisted of 5% DDT, 47% rosin, 33% Herculyn (hydrogenated methyl abietate) and 15% dibutyl phthalate. The mixture killed all of the ticks in the ears and prevented reinfestation for 3-6 weeks; in other words, two treatments per season was all that was required in many localities. One gallon of the material was adequate to treat 125-150 head of cattle. Rude recommended application to the ears of cattle and sheep as soon as the ticks were numerous. The sticky preparation was smeared on the inside and outside of the ears and around the base of the horns with the bare hands. The obvious disadvantage of this treatment, and probably the principal reason that it never became highly popular, was the large amount of time required to run the cattle through a squeeze chute and hand treat each ear.

It was also shown that DDT could also be applied as a spray using about 1 1/2 to 2 pints of 2.3% DDT per animal to wet all parts of the body. In tests conducted in Florida the sprays were equal to 2 ear smears, Stock 1037 and a cold cream base smear (Savannah No. 5, with 7.5% DDT), in both initial kill and protection against reinfestation. The tests showed that all formulations gave satisfactory control for about one month. It was concluded that in the Southeast two applications of the spray, one in late July or early August and another one month later, would provide a full season's tick control.

In a report of the same work in the Journal of Economic Entomology, it appeared that the tests were started late in the season when populations were declining as the number of ticks on untreated animals had greatly decreased 2-4 weeks after the cattle were treated. In their conclusions, the authors say that the number of applications required and the minimum effective dose were not determined.

Work by USDA researchers in Texas and Florida showed that the concentration of DDT in sprays and dips could be reduced if gamma - BHC was added to make a combination spray or dip. Work with several species of ticks demonstrated the value of sprays that contained 0.25% technical benzene hexachloride (mixed isomers, usually 12% gamma - BHC) and 0.5 to 0.75% DDT. The very effective and popular Du Pont Dip 30 was extensively used in Florida and other southeastern states at a concentration of 0.5% DDT plus 0.03% gamma - BHC (from mixed isomers). Knipling (1952) said that sprays containing 0.5% toxaphene or benzene hexachloride (0.025% gamma isomer) and 0.5% DDT had been successfully used against Amblyomma maculatum and several other species of livestock ticks.

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Early experiments conducted in Bee County, Texas by workers at the Kerrville laboratory (Clark and Deer) indicated that toxaphene wettable powder was completely effective in destroying all ticks on cattle at time of spraying or dipping and gave 2-3 weeks protection against any damaging reinfestation (Unpublished, Kerrville, 4th QR 1948). Smears containing 2% gamma - BHC plus 10% toxaphene, chlordane or DDT were also tested. The smears containing toxaphene and chlordane were more effective in protecting against reinfestation than the one with DDT.

Special formulations of toxaphene for use in vats were developed in 1948 and 1949 and tests by Clark & Vallier (Unpublished) indicated that 2 weeks effective protection was provided by dipping cattle in the Coopertox formulation prepared to provide 0.5% toxaphene. The number of screwworm cases predisposed by tick injury was reduced from 40 to none in a herd dipped in Coopertox and from 27 to 1 in another herd dipped twice at biweekly intervals in another formulation of toxaphene.

Knipling (1951) in a compilation of results obtained by several workers said that 0.025% gamma - BHC plus 0.5% DDT would give good control of Gulf Coast ticks for 2 to 3 weeks. Chlordane was about equally effective against lone star and Gulf Coast ticks, that is a concentration of 0.5% gave nearly complete kill of all stages and was about equal to DDT for protection against reinfestation. Good control of all stages resulted when cattle were dipped or sprayed with 0.5% toxaphene. Also, good protection against reinfestation was provided for 2 to 3 weeks, depending on the abundance of ticks. It was concluded that 0.5% toxaphene and a combination 0.025% lindane - 0.5% DDT sprays were comparable in effectiveness for control of this tick.

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Justification for allotment of contingency funds for research on control of Gulf Coast tick. - 1974 summer field tests.

The Gulf Coast tick, Amblyomma maculatum, is a highly important enemy of cattle and other classes of livestock each summer in a region about 100 to 150 miles wide around the entire Gulf Coast of the United States and along the Atlantic Seaboard as far north as South Carolina. The adult ticks attach to the inner and outer surfaces of the ears of cattle in large numbers and cause extensive swelling of the ear, cracking of the skin and the ear becomes covered with a wet, sticky coating of serum, with some blood and tick feces. The ticks are very irritating to the host and cattle often further injure the ears and head by rubbing against trees, posts and other objects. If cattle, especially young animals, become heavily infested with ticks the ears become deformed and typically present a condition known as "gotch ear." Cattle buyers discriminate against gotch-eared calves and either refuse to buy them or dock them as much as \$4.00 per hundred weight.

In addition, cattle that are heavily infested with ticks do not feed normally and the ticks interfere with weight gains or even cause cattle to lose weight and condition.

Historically, the most serious losses caused by the Gulf Coast tick are those that result when screwworm infest the ears. The lesions caused by the ticks and accompanying suppuration are highly attractive to ovipositing screwworm flies and over 85% of the screwworm cases in the Gulf Coast tick area in July, August and September are predisposed by tick injury. This was true when the problem was studied in the 1930's and it was again

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true in Subtropical Texas in 1973. In fact, the problem was in many ways even more acute in 1973 than it was before 1962 when the Southwestern Screwworm Eradication Program was launched because in the 11 year interval ranchers had relaxed their vigilance and dropped many of their tick control measures. In the years that they did not have to contend with screwworms many ranchers ignored the Gulf Coast tick, partly because of the cost of insecticides, but mostly because of the labor shortage and the near impossibility of gathering cattle for spraying or dipping on schedule.

No monetary figures are available, but Subtropical Texas cattle raisers suffered an enormous loss from the combined effects of tick and screwworm injury in 1972 and 1973. These losses resulted from the death of livestock, from depreciation in the value of animals that survived and from the cost of supplies and labor for tick and screwworm control. Many ranchers felt compelled to cut the ears off of their cows and on some of the larger ranches hundreds of cattle lost their ears due to this parasite and/or screwworm infestation.

The tick-screwworm infestation was very expensive to APHIS and the Texas Animal Health Commission. Most of the screwworm cases in Texas in 1973 were predisposed by Gulf Coast tick injury and very heavy drops of sterile flies were made in the infested region for a period of about 5 months. Other large amounts of money were spent for insecticide and livestock inspectors to help combat the two pests.

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The first step in the study of the genetics of the species is to determine the range of the species in the past. This can be done by studying the distribution of the species in the present and by comparing it with the distribution of the species in the past. The second step is to determine the genetic structure of the species. This can be done by studying the distribution of the species in the present and by comparing it with the distribution of the species in the past. The third step is to determine the genetic structure of the species. This can be done by studying the distribution of the species in the present and by comparing it with the distribution of the species in the past. The fourth step is to determine the genetic structure of the species. This can be done by studying the distribution of the species in the present and by comparing it with the distribution of the species in the past. The fifth step is to determine the genetic structure of the species. This can be done by studying the distribution of the species in the present and by comparing it with the distribution of the species in the past. The sixth step is to determine the genetic structure of the species. This can be done by studying the distribution of the species in the present and by comparing it with the distribution of the species in the past. The seventh step is to determine the genetic structure of the species. This can be done by studying the distribution of the species in the present and by comparing it with the distribution of the species in the past. The eighth step is to determine the genetic structure of the species. This can be done by studying the distribution of the species in the present and by comparing it with the distribution of the species in the past. The ninth step is to determine the genetic structure of the species. This can be done by studying the distribution of the species in the present and by comparing it with the distribution of the species in the past. The tenth step is to determine the genetic structure of the species. This can be done by studying the distribution of the species in the present and by comparing it with the distribution of the species in the past.

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Gulf Coast Ticks

1974 Field Tests

1. Insecticidal control

A. Ear smears - (In cooperation with J. Deer)

Stock 1037 or similar base plus various registered insecticides. Determine initial kill and period of protection against reinfestation.

(Perhaps include 5% coumaphos dust as used for spinose ear tick control).

B. Dust bags

Test commercially available bags by keeping them in tick infested pastures and making weekly, if possible, or bi-weekly counts of adult ticks in ears of cattle.

C. Conventional sprays & dips

Tick infestations and screwworm infestations in herds sprayed or dipped with coumaphos, toxaphene, dioxathion, Rabon, Supona and other insecticides.

D. Use of ear tags, halters and other devices impregnated with dichlorvas and other volatile insecticides. Determine effectiveness of such devices and duration of effectiveness.

It is noted that the above methods are not mutually exclusive and may be used in combination.

I. Insecticidal control - Various insecticides have been used to control ticks on livestock.

These include: 1. DDT - 0.5% solution in kerosene or diesel oil. 2. Dieldrin - 0.5% solution in kerosene or diesel oil.

A. Ear amputations - (In cooperation with J. Deer) Ear amputations have been made on various livestock.

Before 1974 Stock 1037 or similar base plus various registered insecticides.

Determine initial kill and period of protection against

reinfestation.

(Perhaps include 5% coumaphos dust as used for equine ear

tick control).

B. Dust bags

Test commercially available bags by keeping them in tick infested

pastures and making weekly, if possible, or bi-weekly counts of

adult ticks in ears of cattle.

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dichlorvos and other volatile insecticides. Determine effective-

ness of such devices and duration of effectiveness.

Manpower and Equipment Needs

Gulf Coast Tick Field Tests

- I. 4-6 new men (temporary - Graduate students)
- II. 2 vehicles (pick-ups or panel wagons)
- III. 1 new power sprayer
- IV. Chemicals
 - (1) 300 ft. 3/4" Vapona impregnated PVC resin strips.
300 ft. 3/4" Vapona + Prolate (Imidan) strips.
300 ft. 3/4" Vapona + Ralio strips.
 - (2) Dust Bags
 - a. 1% Co-Ral (20 bags)
 - b. 3% Co-Ral " "
 - c. 3% Cisdrin " "
 - d. 3% Rabon " "
 - e. Homemade 5% toxaphene dust bags?
 - (3) Spray-on materials
 - a. 10 gal. 61% E.C. Toxaphene (for 0.5% finished spray)
 - b. 10 gal. Rabon E.C. concentrate
 - c. 10 gal. Co-Ral E.C. concentrate
 - d. 10 gal. Delnav E.C. concentrate (0.15% finished spray)
 - (4) Smears

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 - 300 ft. 3/4" Vapona + Prolate (Imidan) strips.
 - 300 ft. 3/4" Vapona + Ralston strips.
 - (2) Dust Bags
 - a. 1X Co-Ral (20 bags)
 - b. 3X Co-Ral " "
 - c. 3X Cladkin " "
 - d. 3X Rapon " "
 - e. Homemade 5% toxaphene dust bags?
 - (3) Spray-on materials
 - a. 10 gal. 51X E.C. Toxaphene (for 0.5% finished spray)
 - b. 10 gal. Rapon E.C. concentrate
 - c. 10 gal. Co-Ral E.C. concentrate
 - d. 10 gal. Delnav E.C. concentrate (0.15% finished spray)
 - (4) Smears

The Gulf Coast tick, Amblyomma maculatum is widely distributed in the New World, but is most abundant in coastal regions of high humidity. In the United States it is found along the entire coast of the Gulf of Mexico but does not usually extend inland more than 100-150 miles. During wet climatic cycles the tick survives and reproduces farther inland but disappears from those areas during periods of average or less than average rainfall.

Each stage of development seeks a different host. The larvae and nymphs parasitize a large variety of birds and small animals while the adults prefer larger animals such as deer, coyotes, dogs and all kinds of livestock. The adults are serious enemies of cattle and other domestic animals because of their injuries to the ear and the frequency with which they predispose screwworm attacks. The ticks attach to the ear, especially to the inner surface of the outer ear but also to the outer surface and base of the ear, base of the horns and in skin folds such as around the hump of Brahma cattle. The ticks cause the ear to swell and crack and serum oozes from the lesions. These sites are highly attractive to ovipositing screwworm flies and during the height of the tick season more than 85% of the screwworm infestations are predisposed by Gulf Coast tick injury.

There appears to be only one generation of the tick per year. When the engorged female tick drops from the host she seeks cover and concealment on the surface of the soil. The eggs are deposited at these sites, an average of over 8,000 per female and as many as 18,000 have been reported. During the late summer and early fall the eggs hatch in 19 to 60 days depending on temperature but eggs deposited in the late fall may not hatch until the following spring.

The larvae may overwinter in pastures in either the fed or unfed condition. Scientific studies have shown most of the larvae feed on a bird or small rodent during the period August to November. Molting takes place on the ground within 9 to 12 days if temperatures are above 70°F. Feeding nymphs are found on the kinds of hosts at almost anytime of the year but typically are most abundant in the late fall and early spring. Longevity of the nymph may vary from 2 to 6 months depending on weather conditions and the availability of hosts. After engorging, the nymphs search for a protected resting place, often in the crowns of bunch grass. At 70-80°F the nymphs molt in about 20 days but nymphs that engorge in the fall may not molt until the following spring.

The adults may be found on their hosts at any time from April until October but are most abundant from July until September. A number of records indicate that peak abundance is most likely to occur about the middle of July. Males ordinarily attach before females and early reports of Gulf Coast ticks on cattle are usually based on finding a few males.

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Each stage of development seeks a different host. The larvae and nymphs parasitize a large variety of birds and small animals while the adults prefer larger animals such as deer, coyotes, dogs and all kinds of livestock. The adults are voracious enemies of cattle and other domestic animals because of their injuries to the ear and the frequency with which they produce sorework attacks. The ticks attach to the ear, especially to the inner surface of the outer ear but also to the outer surface and base of the ear, base of the horns and in skin folds such as around the hump of Brahman cattle. The ticks cause the ear to swell and crack and serum oozes from the lesions. These sites are highly attractive to over-biting sorework flies and during the height of the tick season more than 85% of the sorework infestations are predisposed by Gulf Coast tick injury.

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Gladney (1971) has shown that unfed females search for males that are already attached. Males apparently survive for several months (on the same host) and are capable of inseminating numerous females.

The unfed female moves about on the body of the host and appears to have a strong inclination to attach (1) near an attached male, (2) near aggregations of attached ticks, (3) on or near the ears of the host animal.

Males attach and feed for 6-7 days before they are ready to copulate. Females will feed but will not engorge until they have mated so the time that females remain on a host is usually dependent on the time of mating. If several sexually mature males are already present when the female attaches she will usually feed, mate, engorge and detach within 6-8 days after she attached to the host (Hixson 1940).

CONTROL

It has been reported by ranchers that both pasture burning and mowing help to reduce the numbers of Gulf Coast ticks found in a particular locality. Since the unfed forms of the ticks are highly susceptible to desiccation it is reasonable to presume that many are killed by any practice that reduces the soil and air humidity at ground level. Such cultural practices cannot be expected to keep pastures tick free however because of the movement of tick-infested birds, rodents and other wild animals from one pasture to another.

For many years livestock owners used a large variety of home remedies to treat the ears of their domestic animals. These remedies included such materials as axle grease, turpentine, kerosene and many others. After screwworms moved from Texas to the southeastern United States in 1933 concerted efforts were made to control Gulf Coast ticks as a means of alleviating the screwworm problem. Spicer and Dove (1938) recommended swabbing the ears of cattle with a mixture of 3 quarts of pine tar oil, 1 quart of cottonseed or linseed oil and 1 pint of benzol. This mixture killed the ticks in the ears at time of application and also was claimed to repel attaching adults for as long as 17 days.

At this same time many southern ranchers were still combatting a fever tick and vats charged with arsenic dip were readily available. Undoubtedly many Gulf Coast ticks were killed by dipping cattle in arsenical solutions but these treatments had two deficiencies: (1) it was very difficult to wet the inside surface of the ear and (2) no significant residue of arsenic was deposited on the hair to continue to kill unfed adults that were moving over the cattle in search of a site of attachment.

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At this same time many southern ranchers were still combating a fever tick and vats charged with arsenic dip were readily available. Undoubtedly many Gulf Coast ticks were killed by dipping cattle in arsenical solutions but these treatments had two difficulties: (1) it was very difficult to wet the inside surface of the ear and (2) no significant residue of arsenic was deposited on the hair to continue to kill unfed adults that were moving over the cattle in search of a site of attachment.

When DDT became available to researchers in 1944 Rude and Smith (1944) and Rude (1946) developed a formulation of the insecticide in a non-drying adhesive that gave excellent tick control. Their Stock 1037, developed at the Menard, Texas laboratory, consisted of 5% DDT, 47% rosin, 33% Herculyn (hydrogenated methyl abietate) and 15% dibutyl phthalate. The mixture killed all of the ticks in the ears and prevented reinfestation for 3-6 weeks; in other words, two treatments per season was all that was required in many localities. One gallon of the material was adequate to treat 125-150 head of cattle. Rude recommended application to the ears of cattle and sheep as soon as the ticks were numerous. The sticky preparation was smeared on the inside and outside of the ears and around the base of the horns with the bare hands. The obvious disadvantage of this treatment, and probably the principal reason that it never became highly popular, was the large amount of time required to run the cattle through a squeeze chute and hand treat each ear.

It was also shown that DDT could also be applied as a spray using about 1 1/2 to 2 pints of 2.3% DDT per animal to wet all parts of the body. In tests conducted in Florida the sprays were equal to 2 ear smears, Stock 1037 and a cold cream base smear (Savannah No. 5, with 7.5% DDT), in both initial kill and protection against reinfestation. The tests showed that all formulations gave satisfactory control for about one month. It was concluded that in the Southeast two applications of the spray, one in late July or early August and another one month later, would provide a full season's tick control.

In a report of the same work in the Journal of Economic Entomology, it appeared that the tests were started late in the season when populations were declining as the number of ticks on untreated animals had greatly decreased 2-4 weeks after the cattle were treated. In their conclusions, the authors say that the number of applications required and the minimum effective dose were not determined.

Work by USDA researchers in Texas and Florida showed that the concentration of DDT in sprays and dips could be reduced if gamma - BHC was added to make a combination spray or dip. Work with several species of ticks demonstrated the value of sprays that contained 0.25% technical benzene hexachloride (mixed isomers, usually 12% gamma - BHC) and 0.5 to 0.75% DDT. The very effective and popular Du Pont Dip 30 was extensively used in Florida and other southeastern states at a concentration of 0.5% DDT plus 0.03% gamma - BHC (from mixed isomers). Knipling (1952) said that sprays containing 0.5% toxaphene or benzene hexachloride (0.025% gamma isomer) and 0.5% DDT had been successfully used against Amblyomma maculatum and several other species of livestock ticks.

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Early experiments conducted in Bee County, Texas by workers at the Kerrville laboratory (Clark and Deer) indicated that toxaphene wettable powder was completely effective in destroying all ticks on cattle at time of spraying or dipping and gave 2-3 weeks protection against any damaging reinfestation (Unpublished, Kerrville, 4th QR 1948). Smears containing 2% gamma - BHC plus 10% toxaphene, chlordane or DDT were also tested. The smears containing toxaphene and chlordane were more effective in protecting against reinfestation than the one with DDT.

Special formulations of toxaphene for use in vats were developed in 1948 and 1949 and tests by Clark & Vallier (Unpublished) indicated that 2 weeks effective protection was provided by dipping cattle in the Coopertox formulation prepared to provide 0.5% toxaphene. The number of screwworm cases predisposed by tick injury was reduced from 40 to none in a herd dipped in Coopertox and from 27 to 1 in another herd dipped twice at biweekly intervals in another formulation of toxaphene.

Knipling (1951) in a compilation of results obtained by several workers said that 0.025% gamma - BHC plus 0.5% DDT would give good control of Gulf Coast ticks for 2 to 3 weeks. Chlordane was about equally effective against lone star and Gulf Coast ticks, that is a concentration of 0.5% gave nearly complete kill of all stages and was about equal to DDT for protection against reinfestation. Good control of all stages resulted when cattle were dipped or sprayed with 0.5% toxaphene. Also, good protection against reinfestation was provided for 2 to 3 weeks, depending on the abundance of ticks. It was concluded that 0.5% toxaphene and a combination 0.025% lindane - 0.5% DDT sprays were comparable in effectiveness for control of this tick.

Early experiments conducted in Bee County, Texas by workers at the Kerrville Laboratory (Clark and Boer) indicated that toxaphene vermicular powder was completely effective in destroying all ticks on cattle at time of spraying or dipping and gave 2-3 weeks protection against any damaging reinfestation (Unpublished, Kerrville, Tex 1948). Sprays containing 2X gamma - BHC plus 10X toxaphene, chlorthane or DDT were also tested. The sprays containing toxaphene and chlorthane were more effective in protecting against reinfestation than the one with DDT.

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Justification for allotment of contingency funds for research on control of Gulf Coast tick. - 1974 summer field tests.

The Gulf Coast tick, Amblyomma maculatum, is a highly important enemy of cattle and other classes of livestock each summer in a region about 100 to 150 miles wide around the entire Gulf Coast of the United States and along the Atlantic Seaboard as far north as South Carolina. The adult ticks attach to the inner and outer surfaces of the ears of cattle in large numbers and cause extensive swelling of the ear, cracking of the skin and the ear becomes covered with a wet, sticky coating of serum, with some blood and tick feces. The ticks are very irritating to the host and cattle often further injure the ears and head by rubbing against trees, posts and other objects. If cattle, especially young animals, become heavily infested with ticks the ears become deformed and typically present a condition known as "gotch ear." Cattle buyers discriminate against gotch-eared calves and either refuse to buy them or dock them as much as \$4.00 per hundred weight.

In addition, cattle that are heavily infested with ticks do not feed normally and the ticks interfere with weight gains or even cause cattle to lose weight and condition.

Historically, the most serious losses caused by the Gulf Coast tick are those that result when screwworm infest the ears. The lesions caused by the ticks and accompanying suppuration are highly attractive to ovipositing screwworm flies and over 85% of the screwworm cases in the Gulf Coast tick area in July, August and September are predisposed by tick injury. This was true when the problem was studied in the 1930's and it was again

Justification for allotment of contingency funds for research on control

of Gulf Coast tick, *Amblyomma maculatum*, 1934 summer field tests.

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ears and head by rubbing against trees, posts and other objects. If cattle,

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Coast tick area in July, August and September are produced by tick injury.

This was true when the problem was studied in the 1930's and it was again

true in Subtropical Texas in 1973. In fact, the problem was in many ways even more acute in 1973 than it was before 1962 when the Southwestern Screwworm Eradication Program was launched because in the 11 year interval ranchers had relaxed their vigilance and dropped many of their tick control measures. In the years that they did not have to contend with screwworms many ranchers ignored the Gulf Coast tick, partly because of the cost of insecticides, but mostly because of the labor shortage and the near impossibility of gathering cattle for spraying or dipping on schedule.

No monetary figures are available, but Subtropical Texas cattle raisers suffered an enormous loss from the combined effects of tick and screwworm injury in 1972 and 1973. These losses resulted from the death of livestock, from depreciation in the value of animals that survived and from the cost of supplies and labor for tick and screwworm control. Many ranchers felt compelled to cut the ears off of their cows and on some of the larger ranches hundreds of cattle lost their ears due to this parasite and/or screwworm infestation.

The tick-screwworm infestation was very expensive to APHIS and the Texas Animal Health Commission. Most of the screwworm cases in Texas in 1973 were predisposed by Gulf Coast tick injury and very heavy drops of sterile flies were made in the infested region for a period of about 5 months. Other large amounts of money were spent for insecticide and livestock inspectors to help combat the two pests.

An apparently aberrant population of Gulf Coast has become established in northeastern Oklahoma and southeastern Kansas and has built up to the extent that it causes important economic losses. The ability of the tick

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The tick-screwworm infestation was very expensive to APHIS and the Texas Animal Health Commission. Most of the screwworm cases in Texas in 1973 were predated by Gulf Coast tick injury and very heavy drops of acaricide were made in the infested region for a period of about 5 months. Other large amounts of money were spent for insecticide and livestock inspectors to help combat the two pests.

An apparently aberrant population of Gulf Coast has become established in northeastern Oklahoma and southeastern Kansas and has built up to the extent that it causes important economic losses. The ability of the tick

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Gulf Coast Ticks

1974 Field Tests

1. Insecticidal control

A. Ear smears - (In cooperation with J. Deer)

Stock 1037 or similar base plus various registered insecticides. Determine initial kill and period of protection against reinfestation.

(Perhaps include 5% coumaphos dust as used for spinose ear tick control).

B. Dust bags

Test commercially available bags by keeping them in tick infested pastures and making weekly, if possible, or bi-weekly counts of adult ticks in ears of cattle.

C. Conventional sprays & dips

Tick infestations and screwworm infestations in herds sprayed or dipped with coumaphos, toxaphene, dioxathion, Rabon, Supona and other insecticides.

D. Use of ear tags, halters and other devices impregnated with dichlorvas and other volatile insecticides. Determine effectiveness of such devices and duration of effectiveness.

I. Insecticidal control

A. Bar screens - (In cooperation with J. Dear)

Stock 1037 or similar base plus various registered insecticides.

Determine initial kill and period of protection against

reinfestation.

(Perhaps include 5% coumaphos dust as used for equine ear

tick control).

B. Dust bags

Test commercially available bags by keeping them in tick infested

pastures and making weekly, if possible, or bi-weekly counts of

adult ticks in ears of cattle.

C. Conventional sprays & dips

Tick infestations and serosus infestations in herds sprayed

or dipped with coumaphos, toxaphene, dioxathion, Rabon, Supona

and other insecticides.

D. Use of ear tags, halters and other devices impregnated with

dichlorvos and other volatile insecticides. Determine effective-

ness of such devices and duration of effectiveness.

Manpower and Equipment Needs

Gulf Coast Tick Field Tests

- I. 4-6 new men (temporary - Graduate students)
- II. 2 vehicles (pick-ups or panel wagons)
- III. 1 new power sprayer
- IV. Chemicals
 - (1) 300 ft. 3/4" Vapona impregnated PVC resin strips.
300 ft. 3/4" Vapona + Prolate (Imidan) strips.
300 ft. 3/4" Vapona + Ralion strips.
 - (2) Dust Bags
 - a. 1% Co-Ral (20 bags)
 - b. 3% Co-Ral " "
 - c. 3% Cisdrin " "
 - d. 3% Rabon " "
 - e. Homemade 5% toxaphene dust bags?
 - (3) Spray-on materials
 - a. 10 gal. 61% E.C. Toxaphene (for 0.5% finished spray)
 - b. 10 gal. Rabon E.C. concentrate
 - c. 10 gal. Co-Ral E.C. concentrate
 - d. 10 gal. Delnav E.C. concentrate (0.15% finished spray)
 - (4) Smears

Manpower and Equipment Needs
Gulf Coast Fish Field Tests

- I. 4-6 new men (Temporary - Graduate students)
- II. 3 vehicles (pick-ups or panel wagons)
- III. 1 new power sprayer
- IV. Chemicals
 - (1) 300 ft. 3/4" Vapona impregnated PVC resin strips.
 - 300 ft. 3/4" Vapona + Prostate (Imidan) strips.
 - 300 ft. 3/4" Vapona + Ralston strips.
 - (2) Dust Bags
 - a. 1X Co-Ral (20 bags)
 - b. 3X Co-Ral "
 - c. 3X Cladria "
 - d. 3X Rabon "
 - e. Home-made 5X toxaphene dust bags?
 - (3) Spray-on materials
 - a. 10 gal. 61X E.C. Toxaphene (for 0.5X finished spray)
 - b. 10 gal. Rabon E.C. concentrate
 - c. 10 gal. Co-Ral E.C. concentrate
 - d. 10 gal. Delnav E.C. concentrate (0.15X finished spray)
 - (4) Smears

REFERENCE SLIP

5/28/74

TO

H C Cox, ADA

NOLA

*via telephone
5/28/74
J.E.*

☐

ACTION

☐

NOTE AND RETURN

☐

APPROVAL

☐

PER PHONE CALL

☐

AS REQUESTED

☐

RECOMMENDATION

☐

FOR COMMENT

☐

REPLY FOR SIGNATURE OF

☒

FOR INFORMATION

☐

RETURNED

☐

INITIALS

☐

SEE ME

☐

NOTE AND FILE

☐

YOUR SIGNATURE

REMARKS

As per phone conversation,

Gladney

Dr. Glancey indicated that he

would devote 50% of his time

in carrying out the Gulf

Coast Tick field tests.

Attachments - 9 pages

(Re sent: name corrected) JE

FROM

E. A. Taylor, AD

Weslaco, TX

The Gulf Coast tick, Amblyomma maculatum is widely distributed in the New World, but is most abundant in coastal regions of high humidity. In the United States it is found along the entire coast of the Gulf of Mexico but does not usually extend inland more than 100-150 miles. During wet climatic cycles the tick survives and reproduces farther inland but disappears from those areas during periods of average or less than average rainfall.

Each stage of development seeks a different host. The larvae and nymphs parasitize a large variety of birds and small animals while the adults prefer larger animals such as deer, coyotes, dogs and all kinds of livestock. The adults are serious enemies of cattle and other domestic animals because of their injuries to the ear and the frequency with which they predispose screwworm attacks. The ticks attach to the ear, especially to the inner surface of the outer ear but also to the outer surface and base of the ear, base of the horns and in skin folds such as around the hump of Brahma cattle. The ticks cause the ear to swell and crack and serum oozes from the lesions. These sites are highly attractive to ovipositing screwworm flies and during the height of the tick season more than 85% of the screwworm infestations are predisposed by Gulf Coast tick injury.

There appears to be only one generation of the tick per year. When the engorged female tick drops from the host she seeks cover and concealment on the surface of the soil. The eggs are deposited at these sites, an average of over 8,000 per female and as many as 18,000 have been reported. During the late summer and early fall the eggs hatch in 19 to 60 days depending on temperature but eggs deposited in the late fall may not hatch until the following spring.

The larvae may overwinter in pastures in either the fed or unfed condition. Scientific studies have shown most of the larvae feed on a bird or small rodent during the period August to November. Molting takes place on the ground within 9 to 12 days if temperatures are above 70°F. Feeding nymphs are found on the kinds of hosts at almost anytime of the year but typically are most abundant in the late fall and early spring. Longevity of the nymph may vary from 2 to 6 months depending on weather conditions and the availability of hosts. After engorging, the nymphs search for a protected resting place, often in the crowns of bunch grass. At 70-80°F the nymphs molt in about 20 days but nymphs that engorge in the fall may not molt until the following spring.

The adults may be found on their hosts at any time from April until October but are most abundant from July until September. A number of records indicate that peak abundance is most likely to occur about the middle of July. Males ordinarily attach before females and early reports of Gulf Coast ticks on cattle are usually based on finding a few males.

Gladney (1971) has shown that unfed females search for males that are already attached. Males apparently survive for several months (on the same host) and are capable of inseminating numerous females.

The unfed female moves about on the body of the host and appears to have a strong inclination to attach (1) near an attached male, (2) near aggregations of attached ticks, (3) on or near the ears of the host animal.

Males attach and feed for 6-7 days before they are ready to copulate. Females will feed but will not engorge until they have mated so the time that females remain on a host is usually dependent on the time of mating. If several sexually mature males are already present when the female attaches she will usually feed, mate, engorge and detach within 6-8 days after she attached to the host (Hixson 1940).

CONTROL

It has been reported by ranchers that both pasture burning and mowing help to reduce the numbers of Gulf Coast ticks found in a particular locality. Since the unfed forms of the ticks are highly susceptible to desiccation it is reasonable to presume that many are killed by any practice that reduces the soil and air humidity at ground level. Such cultural practices cannot be expected to keep pastures tick free however because of the movement of tick-infested birds, rodents and other wild animals from one pasture to another.

For many years livestock owners used a large variety of home remedies to treat the ears of their domestic animals. These remedies included such materials as axle grease, turpentine, kerosene and many others. After screwworms moved from Texas to the southeastern United States in 1933 concerted efforts were made to control Gulf Coast ticks as a means of alleviating the screwworm problem. Spicer and Dove (1938) recommended swabbing the ears of cattle with a mixture of 3 quarts of pine tar oil, 1 quart of cottonseed or linseed oil and 1 pint of benzol. This mixture killed the ticks in the ears at time of application and also was claimed to repel attaching adults for as long as 17 days.

At this same time many southern ranchers were still combatting a fever tick and vats charged with arsenic dip were readily available. Undoubtedly many Gulf Coast ticks were killed by dipping cattle in arsenical solutions but these treatments had two deficiencies: (1) it was very difficult to wet the inside surface of the ear and (2) no significant residue of arsenic was deposited on the hair to continue to kill unfed adults that were moving over the cattle in search of a site of attachment.

When DDT became available to researchers in 1944 Rude and Smith (1944) and Rude (1946) developed a formulation of the insecticide in a non-drying adhesive that gave excellent tick control. Their Stock 1037, developed at the Menard, Texas laboratory, consisted of 5% DDT, 47% rosin, 33% Hercolyn (hydrogenated methyl abietate) and 15% dibutyl phthalate. The mixture killed all of the ticks in the ears and prevented reinfestation for 3-6 weeks; in other words, two treatments per season was all that was required in many localities. One gallon of the material was adequate to treat 125-150 head of cattle. Rude recommended application to the ears of cattle and sheep as soon as the ticks were numerous. The sticky preparation was smeared on the inside and outside of the ears and around the base of the horns with the bare hands. The obvious disadvantage of this treatment, and probably the principal reason that it never became highly popular, was the large amount of time required to run the cattle through a squeeze chute and hand treat each ear.

It was also shown that DDT could also be applied as a spray using about 1 1/2 to 2 pints of 2.3% DDT per animal to wet all parts of the body. In tests conducted in Florida the sprays were equal to 2 ear smears, Stock 1037 and a cold cream base smear (Savannah No. 5, with 7.5% DDT), in both initial kill and protection against reinfestation. The tests showed that all formulations gave satisfactory control for about one month. It was concluded that in the Southeast two applications of the spray, one in late July or early August and another one month later, would provide a full season's tick control.

In a report of the same work in the Journal of Economic Entomology, it appeared that the tests were started late in the season when populations were declining as the number of ticks on untreated animals had greatly decreased 2-4 weeks after the cattle were treated. In their conclusions, the authors say that the number of applications required and the minimum effective dose were not determined.

Work by USDA researchers in Texas and Florida showed that the concentration of DDT in sprays and dips could be reduced if gamma - BHC was added to make a combination spray or dip. Work with several species of ticks demonstrated the value of sprays that contained 0.25% technical benzene hexachloride (mixed isomers, usually 12% gamma - BHC) and 0.5 to 0.75% DDT. The very effective and popular Du Pont Dip 30 was extensively used in Florida and other southeastern states at a concentration of 0.5% DDT plus 0.03% gamma - BHC (from mixed isomers). Knipling (1952) said that sprays containing 0.5% toxaphene or benzene hexachloride (0.025% gamma isomer) and 0.5% DDT had been successfully used against Amblyomma maculatum and several other species of livestock ticks.

Early experiments conducted in Bee County, Texas by workers at the Kerrville laboratory (Clark and Deer) indicated that toxaphene wettable powder was completely effective in destroying all ticks on cattle at time of spraying or dipping and gave 2-3 weeks protection against any damaging reinfestation (Unpublished, Kerrville, 4th QR 1948). Smears containing 2% gamma - BHC plus 10% toxaphene, chlordane or DDT were also tested. The smears containing toxaphene and chlordane were more effective in protecting against reinfestation than the one with DDT.

Special formulations of toxaphene for use in vats were developed in 1948 and 1949 and tests by Clark & Vallier (Unpublished) indicated that 2 weeks effective protection was provided by dipping cattle in the Coopertox formulation prepared to provide 0.5% toxaphene. The number of screwworm cases predisposed by tick injury was reduced from 40 to none in a herd dipped in Coopertox and from 27 to 1 in another herd dipped twice at biweekly intervals in another formulation of toxaphene.

Knipling (1951) in a compilation of results obtained by several workers said that 0.025% gamma - BHC plus 0.5% DDT would give good control of Gulf Coast ticks for 2 to 3 weeks. Chlordane was about equally effective against lone star and Gulf Coast ticks, that is a concentration of 0.5% gave nearly complete kill of all stages and was about equal to DDT for protection against reinfestation. Good control of all stages resulted when cattle were dipped or sprayed with 0.5% toxaphene. Also, good protection against reinfestation was provided for 2 to 3 weeks, depending on the abundance of ticks. It was concluded that 0.5% toxaphene and a combination 0.025% lindane - 0.5% DDT sprays were comparable in effectiveness for control of this tick.

Justification for allotment of contingency funds for research on control of Gulf Coast tick. - 1974 summer field tests.

The Gulf Coast tick, Amblyomma maculatum, is a highly important enemy of cattle and other classes of livestock each summer in a region about 100 to 150 miles wide around the entire Gulf Coast of the United States and along the Atlantic Seaboard as far north as South Carolina. The adult ticks attach to the inner and outer surfaces of the ears of cattle in large numbers and cause extensive swelling of the ear, cracking of the skin and the ear becomes covered with a wet, sticky coating of serum, with some blood and tick feces. The ticks are very irritating to the host and cattle often further injure the ears and head by rubbing against trees, posts and other objects. If cattle, especially young animals, become heavily infested with ticks the ears become deformed and typically present a condition known as "gotch ear." Cattle buyers discriminate against gotch-eared calves and either refuse to buy them or dock them as much as \$4.00 per hundred weight.

In addition, cattle that are heavily infested with ticks do not feed normally and the ticks interfere with weight gains or even cause cattle to lose weight and condition.

Historically, the most serious losses caused by the Gulf Coast tick are those that result when screwworm infest the ears. The lesions caused by the ticks and accompanying suppuration are highly attractive to ovipositing screwworm flies and over 85% of the screwworm cases in the Gulf Coast tick area in July, August and September are predisposed by tick injury. This was true when the problem was studied in the 1930's and it was again

true in Subtropical Texas in 1973. In fact, the problem was in many ways even more acute in 1973 than it was before 1962 when the Southwestern Screwworm Eradication Program was launched because in the 11 year interval ranchers had relaxed their vigilance and dropped many of their tick control measures. In the years that they did not have to contend with screwworms many ranchers ignored the Gulf Coast tick, partly because of the cost of insecticides, but mostly because of the labor shortage and the near impossibility of gathering cattle for spraying or dipping on schedule.

No monetary figures are available, but Subtropical Texas cattle raisers suffered an enormous loss from the combined effects of tick and screwworm injury in 1972 and 1973. These losses resulted from the death of livestock, from depreciation in the value of animals that survived and from the cost of supplies and labor for tick and screwworm control. Many ranchers felt compelled to cut the ears off of their cows and on some of the larger ranches hundreds of cattle lost their ears due to this parasite and/or screwworm infestation.

The tick-screwworm infestation was very expensive to APHIS and the Texas Animal Health Commission. Most of the screwworm cases in Texas in 1973 were predisposed by Gulf Coast tick injury and very heavy drops of sterile flies were made in the infested region for a period of about 5 months. Other large amounts of money were spent for insecticide and livestock inspectors to help combat the two pests.

An apparently aberrant population of Gulf Coast has become established in northeastern Oklahoma and southeastern Kansas and has built up to the extent that it causes important economic losses. The ability of the tick

to survive in an area that was once outside of its normal range is quite disturbing as it suggests a genetic adaptability that could cause what has been considered a regional problem to become a national problem. The possibility of eliminating or modifying this population of the species before it becomes more widespread should be studied.

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 - (4) Smears



TEXAS AGRICULTURAL EXTENSION SERVICE

THE TEXAS A&M UNIVERSITY SYSTEM

SA

College Station
Texas 77843

May 30, 1974

AIR MAIL

Mr. E.A. Taylor
Research Area Director
Subtropical Texas Area
P.O. Box 267
Weslaco, Texas 78596

Dear Mr. Taylor:

Enclosed are duplicates of slides used by Dr. Bill Gladney during the recent screwworm - Gulf Coast tick symposia. Dr. Gladney requested that these be furnished for your use. You may keep these for use if you desire.

Sincerely,

Weldon H. Newton

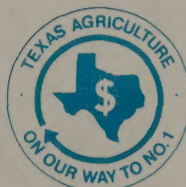
Weldon H. Newton
Extension Entomologist

WHN/pc
cc: Dr. W.J. Gladney

RECEIVED

JUN 3 1974

AREA OFFICE
WESLACO, TEXAS



→ E. A. Taylor
Weslaco, Texas 2/18

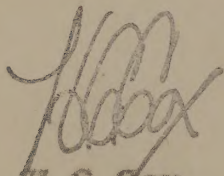
June 5, 1974

Subject: Gulf Coast Ticks

To: Kathleen Ruckert
Budget and Finance Office, SRAO

After reading a May 28 telecopier report from E. A. Taylor regarding problems associated with Gulf Coast tick control, I talked by telephone with Drs. J. Rex Johnston and Roger O. Drummond. Dr. Drummond agreed in the importance of the problem, indicating that he had discussed it with Mr. Taylor and Dr. R. A. Hoffman. He said that he plans to put about \$1,000 per month into the broad form cooperative agreement at Texas A&M beginning July 1 in order to provide for graduate student support. In addition, Dr. William Gladney from the Kerrville Laboratory will spend up to 50% of his time on the project this summer. He said that Mr. Taylor has agreed to furnish cars and mileage in support of the project and will also buy a sprayer out of funds available to the Subtropical Texas Area. Dr. Drummond indicated that it would be desirable to initiate the work right away but that he lacked sufficient funds to get the project off the ground before July 1. After discussing costs that would probably be involved, I told him that we would provide him with \$3,000 immediately so that they could initiate the project.

Please transfer these funds to WRU 7305-15490.


H. C. Cox
Acting Deputy Administrator

cc:

J. R. Johnston, College Station, Texas
E. A. Taylor, Weslaco, Texas
R. O. Drummond, Kerrville, Texas

RECEIVED

JUN 10 1974

AREA OFFICE
WESLACO, TEXAS

RECEIVED

JUN 10 1974

AREA OFFICE
WESTACO, TEXAS

Notes on talk about the
Gulf Coast tick for your
information.

M.A. Price
dc

The Gulf Coast Tick

Copy 2. Henderson
6/5/74/84

Three species of ticks in South Texas bear a strong superficial resemblance to each other and are frequently confused. Two of them have similiar habits but their habits differ from the Gulf coast tick.

Amblyomma cajennense, the cayenne tick, which is extremely abundant in this area and is of considerable importance on cattle and other domestic as well as many wild animals. The larval or seed tick stage is abundant on many birds as well as domestic and wild animals. The adults of this species do not congregate in the ears and around the head as the Gulf coast tick does although they maybe found on the head and ears but not especially in the pinna of the ear in clusters. A closely related species Amblyomma imitator (no common name) is of about the same shape and coloration, has similiar habits, but is usually slightly smaller.

The Gulf coast tick, Amblyomma maculatum, is not as wide and the shape is elongate whereas the other two species are sub-circular.

Distribution

The Gulf coast tick is found from Virginia south to the Gulf Coast states and extends through Mexico into South America. Two factors must be considered in discussing the distribution. One factor is areas from which the ticks have been recorded and secondly the areas where the ticks develop sufficient numbers to cause economic loss to livestock producers. First lets consider the geographical distribution. Modern and rapid methods of transportation of cattle have distributed the ticks to wide spread areas where they may not be able to survive. For instance they have been reported from Kansas, Tennessee, and some areas of north Texas. With the exception of an area in Oklahoma they seldom develop sufficient populations to cause economic loss further than 100-150 miles inland from the coast.

RECEIVED

MAY 28 1974

AREA OFFICE
WESLACO, TEXAS

Damage and Relations to Screwworm Infestation

It is difficult to place an exact monetary loss on the damage caused by this tick. Infestation of the ears of young animals cause a crumpled or otherwise deformed ear and buyers frequently offer two to four dollars per hundred weight loss for these animals with deformed ears than they offer for animals without this condition. Feed lot operators frequently will not buy or will dock animals with disfigured ears more than four dollars per hundred weight.

The relation between the Gulf Coast tick and screwworm infestations has been well documented by both state and federal researchers. For instance before the screwworm eradication campaign 50% of the screwworm cases in South Georgia was attributed to Gulf Coast ticks. During mid and late August 1973 60% of 569 and 75% of 58 cases respectively of screwworms that were examined could be attributed to Gulf coast ticks. Environmental conditions that are favorable for the development of large populations of Gulf Coast ticks appear to also be favorable for the development of screwworms - especially during late summer and early fall.

Life History and Habits

Under ideal conditions the developmental time for the various stages in the life cycle are

	minimum	ave	maximum
Eggs hatch	18	21	28
Larvae engorge	2½	4½	10
Larvae molt	7	12	14
Nymphs engorge	4½	5	11
Nymphs molt	17	23	28
Adult females engorge	5	7	18
Preoviposition	3	5	9
Total Days	57	77	118

These figures alone may be quite misleading unless environmental conditions such as temperature, humidity, rainfall and perhaps day length or photoperiod and host associations are also taken into consideration. Low temperatures and low humidities may greatly lengthen the life cycle and the host seeking activity of the larvae, nymphs and/or adults. These activities may also be controlled by other environmental conditions and day length. The incidence of adults collected on wild animals during April (16-20), June (4-8) and August (20-24), shown in the following tables indicate that the build up begins in June and probably reaches a maximum in late August or September. It is also interesting to note that no larvae or nymphs were collected during April and June. Identifications of the larvae collected in August have not been completed however, no nymphs were collected during the August collecting trip. This would indicate the larvae should begin to appear in small numbers in late August and reach a peak in late September or October. Larvae may usually be expected about a month after the adults are noted and the nymphs would be expected three to five weeks after the larvae - about November provided hosts are available for each of the stages.

Birds appear to be the most important natural hosts for the larvae although several small mammals such as various species of rats and squirrels may also serve as hosts. The range habit is an important factor in determining the importance of the larval hosts among both birds and small mammals. Any bird or mammal that visits grassland ranges may become infested but only those that habitually range in such areas would serve as important hosts. Many of the rats, such as the cotton rat that may occur in the grassland range habitat but usually travel along runs and cover only a limited range. Squirrels are of even less importance because of the amount of time spent in trees. The meadow lark is fairly abundant, gregarious,

and searches for food in scattered groups in grassland areas. They usually cover extensive areas during early forenoon and late afternoon. The bobwhite is also an important larval host but its feeding range is less extensive and it feeds in more compact groups. Of course the relative abundance of these two species could change the importance as a larval host. The engorged larvae seem to detach during the morning or afternoon when the host is active. Those that drop from the host late in the season when the average temperature is low ($50-70^{\circ}\text{F}$) may not molt for 4 months and unfed larvae may survive for $5\frac{1}{2}$ -6 months under some environmental conditions. They normally attach to the head of their host.

The host range of the nymphs is similar to the larvae. Ground dwelling birds such as meadow larks and bobwhites are probably the most important but the nymphs also utilize small mammals. They attach to the head of birds and head and neck of small mammals. The engorged nymphs usually leave the host during the morning activity periods of the host. They may survive for up to 6 months without feeding if environmental conditions are not severe and those that leave the host when the temperature is low may require up to $2\frac{1}{2}$ months to molt.

Totals - April Collections (Adults)

Coyote (5)

Amblyomma cajennense
Amblyomma inornatum
Amblyomma maculatum
Dermacentor variabilis

Totals

19 12 males & 7 females
 7 6 males & 1 female
 1 1 male
 68 40 males & 28 females
 95 59 males & 36 females

Javelina (5)

Amblyomma cajennense
Dermacentor variabilis
Dermacentor halli

401 295 males & 106 females
 33 17 males & 16 females
 3 1 male & 2 females
 437 313 males & 124 females

Bobcat (1)

Amblyomma inornatum
Dermacentor variabilis

2 2 males
 24 17 males & 7 females
 26 19 males & 7 females

Raccoon (4)

Amblyomma cajennense
Amblyomma inornatum
Dermacentor variabilis
Ixodes texanus

2 1 male & 1 female
 2 2 males
 83 38 males & 35 females
 2 2 females
 89 51 males & 38 females

Opossum (2)

Amblyomma sp (nymphs)
Dermacentor variabilis

20 25 NN
 20 13 males & 7 females
 20 13 males & 7 females

Cottontail Rabbits (54)

Amblyomma inornatum
Haemaphysalis leporispalustris
Dermacentor variabilis

7 4 males & 3 females
 521 284 males & 237 females
 1 1 male
 529 289 males & 240 females

Ratus ratus (Roof rat)

Amblyomma (nymph)

Packrat (2)

Dermacentor nymph
Ixodes woodi

2 1 N
 2 2 females
 2 2 females

Horse (shetland) (2)

Amblyomma cajennense
Dermacentor variabilis

5 5 females
 5 1 male & 4 females
 10 1 male & 9 females

Totals - June Collections (Adults)

Bobcats (4)

<u>Amblyomma inornatum</u>	41	27 males & 14 females
<u>Amblyomma americanum</u>	1	1 female
- <u>Amblyomma maculatum</u>	1	1 female
<u>Dermacentor variabilis</u>	36	24 males & 12 females
	79	51 males & 28 females

Coyotes (5)

<u>Amblyomma cajennense</u>	37	23 males & 14 females
- <u>Amblyomma maculatum</u>	10	5 males & 5 females
<u>Amblyomma inornatum</u>	28	15 males & 13 females
<u>Amblyomma imitator</u>	1	1 female
<u>Dermacentor variabilis</u>	81	54 males & 27 females
	157	97 males & 60 females

Javelina (5)

<u>Amblyomma cajennense</u>	1335	1116 males & 219 females
<u>Amblyomma imitator</u>	2	2 females
<u>Dermacentor variabilis</u>	17	13 males & 4 females
<u>Dermacentor halli</u>	5	5 males
	1359	1134 males & 225 females

Raccoons (13)

<u>Amblyomma cajennense</u>	32	16 males & 16 females
<u>Amblyomma inornatum</u>	13	3 males & 10 females
<u>Dermacentor variabilis</u>	67	43 males & 24 females
<u>Ixodes texanus</u>	16	16 females
<u>Ixodes cookei</u>	2	2 females
	130	62 males & 68 females

Cottontail Rabbits (39)

<u>Haemaphysalis leporispalustris</u>	96	58 males & 38 females
<u>Amblyomma inornatum</u>	25	13 males & 12 females
	121	71 males & 50 females

Opossums (3)

<u>Amblyomma cajennense</u>	3	3 males
<u>Amblyomma inornatum</u>	2	1 male & 1 female
<u>Dermacentor variabilis</u>	30	14 males & 16 females
	35	18 males & 17 females

Badger (1)

<u>Amblyomma cajennense</u>	6	5 males & 1 female
<u>Amblyomma inornatum</u>	17	9 males & 8 females
<u>Dermacentor variabilis</u>	21	12 males & 9 females
	44	26 males & 18 females

Jackrabbit (1)

<u>Haemaphysalis leporispalustris</u>	1	1 female
	1	1 female

Totals - August Collections (Adults)

Coyotes (6)

<u>Amblyomma cajennense</u>	73	47 males & 26 females
<u>Amblyomma maculatum</u>	226	160 males & 66 females
<u>Amblyomma inornatum</u>	114	71 males & 43 females
<u>Dermacentor variabilis</u>	126	88 males & 38 females
	539	366 males & 173 females

Javelinas (5)

<u>Amblyomma cajennense</u>	1082	820 males & 262 females
<u>Amblyomma maculatum</u>	4	3 males & 1 female
<u>Amblyomma inornatum</u>	1	1 female
<u>Dermacentor variabilis</u>	85	56 males & 29 females
<u>Dermacentor halli</u>	84	69 males & 15 females
	1256	948 males & 308 females

Badger (1)

<u>Amblyomma cajennense</u>	69	39 males & 30 females
<u>Amblyomma maculatum</u>	1	1 male
<u>Amblyomma inornatum</u>	64	39 males & 25 females
<u>Dermacentor halli</u>	1	1 male
<u>Haemaphysalis leporispalustris</u>	2	1 male & 1 female
	137	81 males & 56 females

Cottontail Rabbits (50)

<u>Amblyomma inornatum</u>	247	143 males & 104 females
<u>Haemaphysalis leporispalustris</u>	406	310 males & 96 females
<u>Dermacentor variabilis</u>	1	1 female
	654	453 males & 201 females

Opossums (5)

<u>Amblyomma cajennense</u>	1	1 male
<u>Amblyomma inornatum</u>	1	1 male
<u>Dermacentor variabilis</u>	12	4 males & 8 females
	14	6 males & 8 females

Skunk (1)

<u>Dermacentor variabilis</u>	4	3 males & 1 female
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Bobcats (3)

<u>Amblyomma inornatum</u>	41	24 males & 17 females
<u>Amblyomma maculatum</u>	12	8 males & 4 females
<u>Dermacentor variabilis</u>	32	13 males & 19 females
	85	45 males & 40 females

Raccoons (26)

<u>Amblyomma cajennense</u>	22	18 males & 4 females
<u>Amblyomma inornatum</u>	62	36 males & 26 females
<u>Amblyomma spp</u>	1	1 male
<u>Dermacentor variabilis</u>	230	111 males & 119 females
<u>Ixodes cookei</u>	1	1 female
	316	166 males & 150 females

12
243
16
243
13
935
95



SCREWWORM
&
GULF COAST TICK
SYMPOSIUM



May 20, 1974
Texas A&M University Agricultural
Research and Extension Center
Corpus Christi
(Highway 44, west of Clarkwood)

May 21, 1974
Texas A&M University Agricultural
Research and Extension Center
Weslaco

1:30 - 5:00 p.m.

Moderator: *Mr. J. D. Selman, Jr.*

Sponsored By
Texas Agricultural Extension Service
&
Southwest Screwworm Eradication
Program, APHIS

PROGRAM

- 1:30 Welcome and Introductions
- 1:35 Current Screwworm Situation
and Prospects for the
Remainder of 1974 -
Dr. M. E. Meadows
Dr. Donald Williams
- 2:00 Gulf Coast Tick Situation in
Mexico -
Dr. Alberto Piñon
- 2:20 The Gulf Coast Ear Tick -
Life History, Damage, Dis-
tribution, and Relationship
to Screwworm Infestations -
Professor Manning A. Price
- 2:40 Gulf Coast Tick and Screwworm
Prevention and Control -
James A. Deer
- 3:00 BREAK
- 3:30 USDA Gulf Coast Tick Research
Dr. O. H. Graham
Dr. William J. Gladney
- 3:50 Texas A&M University Tick
Research and Prospects for
the Future -
Dr. P. L. Adkisson
- 4:10 Questions and Discussion

W H O ' S W H O

Dr. P. L. Adkisson

Professor and Head
Department of Entomology
Texas A&M University
College Station, Texas

James A. Deer

Area Entomologist
Texas Agricultural Extension
Service
Weslaco, Texas

Dr. William J. Gladney

Entomologist
U.S. Livestock Insect Laboratory
USDA, ARS
Kerrville, Texas

Dr. O. H. Graham

Entomologist
U.S. Livestock Insect Laboratory
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Dr. M. E. Meadows

Veterinarian-in-Charge
USDA Screwworm Laboratory
Mission, Texas

Dr. Alberto Pinon

Director of Livestock Programs
Ciudad Victoria, Tamps., Mexico

Professor Manning A. Price

Department of Entomology
Texas A&M University
College Station, Texas

J. D. Selman, Jr.

District Extension Agent
Texas Agricultural Extension
Service
Weslaco, Texas

Dr. Donald Williams

Chief Screwworm Staff Officer
ARS
Hyattsville, Maryland

Doubt

✓

Justification for allotment of
contingency funds to ^{For?} research
on control of Gulf Coast tick —
1974 summer field tests

The Gulf Coast tick, Amblyomma
maculatum, is a highly important
enemy of cattle and other classes
of livestock each summer in
a region about ~~100~~ 100 to 150 miles
wide around the entire Gulf
Coast of the United States and
along the Atlantic Seaboard as
far north as South Carolina.

The adult ticks attach to the
inner and outer surfaces of the
ears of cattle in large numbers
and cause extensive swelling of
the ear, cracking of the skin and
the ear ~~is~~ becomes covered with
a wet, sticky coating of serum,
with some blood and tick feces.
The ticks are very irritating to the
host and cattle often further injure
the ears and head by rubbing
against trees, posts and other objects.
If ~~young~~ ^{especially young animals,} cattle become
heavily infested with ticks

justification for allotment of
vacuum pump funds to research
on control of Gulf Coast ticks -
1914 summer field tests

The Gulf Coast Ticks, *Dubophysa*
monticola, is a highly important
enemy of cattle and other classes
of livestock. It is common in
a region about 100 to 150 miles
wide around the entire Gulf
Coast of the United States and
along the Atlantic seaboard as
far north as North Carolina.
The adult ticks attach to the
ears and outer surfaces of the
ears of cattle in large numbers
and cause extensive swelling of
the ear, excoriation of the skin and
the ear is severely irritated. After
a wet, sticky coating of serum,
with some blood and tick feces.
The ticks are very resistant to the
hot and cattle often further injure
the ears and head by rubbing
against trees, posts and other objects.
If young cattle become
infested with ticks

the ears ~~are~~ become deformed and ~~and~~ typically present a condition known as "gotch ear." Cattle buyers discriminate ~~against~~ against gotch-eared calves and either refuse to buy them or dock them as much as \$4⁰⁰ per hundred weight.

In addition ^{that are heavily infested with ticks} (heavily ticks infested) cattle do not feed normally and the ticks interfere with weight gains or even cause cattle to lose weight and condition.

Historically

The most serious losses caused by the Gulf Coast tick are those that result ^{when} from screwworm ^{infest} the ears. The lesions, ^{caused by the ticks} and accompanying suppuration are highly attractive to ovipositing screwworm flies and it ~~has been~~ over 85% of the screwworm cases in the Gulf Coast tick area in ~~the~~ July, August and September are predisposed by ticks injury. This was true when the problem was studied in the 1930's and it

studied in the 1930's and it
was true when the problem was
first raised by this inquiry - This
July, August and September are
in the Gulf Coast this area in
over 82% of the common cases
common flies and ~~the~~
are highly attractive to house flies
leaving and accompanying disfigurement
The common insect the ear. The
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caused by the Gulf Coast ticks
The most serious losses
Historically
cattle to lose weight and condition,
weight gains or even some
and the ticks interfere with
infected cattle do not feed normally
In addition, heavy ticks
hundred weight
them as much as \$4.00 per
refuse to buy them or
gates - based on the fact
buyers discriminate against
known as "gate ear" Cattle
typically present a condition
the ear has become deformed and

Subtropical

was again true in ~~South~~ Texas in 1973. In fact, the problem was in many ways even more acute in 1973 than it was before 1962 when the Southwestern Screwworm Eradication Program was launched because in the 11 year interval ranchers had relaxed ~~many~~ of their vigilance and had dropped many of their tick control measures. In the years that they did not have to contend ~~the~~ with screwworm, many ranchers ignored the Gulf Coast ticks, partly because of the cost of insecticides, but mostly because of the labor shortage and the ~~at~~ near impossibility of gathering cattle for spraying or dipping on schedule -

^{monetary?} No dollar figures are available, but Subtropical Texas cattle raisers suffered an enormous loss from the combined effects of ticks and screwworm injury in 1972 and 1973. These losses resulted from the death of livestock,

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cattle raisers suffered an enormous
loss from the combined effects of
tick and worm infestation in
1915 and 1913. These losses resulted
from the death of livestock,

from depreciation in the value of animals that survived and from the cost of ~~sa~~ supplies and labor for ticks and screwworm control. Many ranchers felt compelled to cut the ears off of their cows and on some of the larger ranches hundreds of cattle lost their ears - due to this practice and/or screwworm infestation.

The ticks - screwworm infestation was very expensive to APHIS and the Texas Animal Health Commission - most of the screwworm cases in Texas in 1973 were predisposed by Gulf Coast ticks injury. And very heavy drops of sterile flies were made in the infested region for a period of about 5 months. Other large amounts of money were spent for insecticide and livestock inspectors to help combat the two pests.

An apparently aberrant population of Gulf Coast has become established in northeastern Oklahoma and southeastern Kansas

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An apparently abundant
 population of Gulf Coast ticks
 became established in northeastern
 Oklahoma and southeastern Kansas

5.

and has built up to the extent that it causes important economic losses. The ability of the ticks to survive in an area that was once outside of its normal range is quite disturbing, as it suggests a genetic adaptability that could cause ~~it~~ what has been considered a regional problem to become a national problem. The possibility of eliminating or modifying this population of the species before it becomes more ^{widespread} widespread should be studied.

and has built up to the extent
that it causes important resources
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contaminated by its removal depends on
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